

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) Optical amplifier device ~~(1)~~ comprising:
 - optical input ~~(10)~~;
 - a first nonlinear optical fiber ~~(12)~~, having a first set of fiber property parameters, comprising a first zero-dispersion wavelength ~~(λ_0)~~;
 - a second nonlinear optical fiber ~~(12)~~, having a second set of fiber property parameters, comprising a second zero-dispersion wavelength ~~(λ_0)~~;
 - optical demultiplexer ~~(14)~~ connecting said optical input ~~(10)~~ and said first and second nonlinear optical fibers ~~(12)~~, directing optical signals within a first wavelength interval ~~($\Delta\lambda$)~~ to said first nonlinear optical fiber ~~(12)~~ and directing optical signals within a second wavelength interval ~~($\Delta\lambda$)~~ to said second nonlinear optical fiber ~~(12)~~;
 - at least one optical pump ~~(18)~~, pumping said first and second nonlinear optical fibers ~~(12)~~ with radiation having a pump wavelength ~~(λ_p)~~ in the vicinity of respective said zero-dispersion wavelength ~~(λ_0)~~;
 - said first nonlinear optical fiber ~~(12)~~ giving a high parametric amplification in said first wavelength interval ~~($\Delta\lambda$)~~ and said second nonlinear optical fiber ~~(12)~~ giving a high parametric amplification in said second wavelength interval ~~($\Delta\lambda$)~~;
 - optical output ~~(20)~~; and
 - optical multiplexer ~~(16)~~ connecting said first and second nonlinear optical fibers ~~(12)~~ and said optical output ~~(20)~~, merging optical signals from said first and second nonlinear optical fibers ~~(12)~~ into said optical output ~~(20)~~;
 - a pump wavelength ~~(λ_p)~~ provided to said first nonlinear optical fiber being positioned outside said first wavelength interval and a pump wavelength ~~(λ_p)~~ provided to

said second nonlinear optical fiber being positioned outside said second wavelength interval.

2. (Currently Amended) Optical amplifier device according to claim 1, ~~characterized in that~~ wherein said first wavelength interval being positioned at a high-gain portion of a gain distribution of said parametric amplification in said first nonlinear optical fiber, and said second wavelength interval being positioned at a high-gain portion of a gain distribution of said parametric amplification in said second nonlinear optical fiber.

3. (Currently Amended) Optical amplifier device according to claim 1 ~~or 2~~, ~~characterized in that~~ wherein said first set of fiber property parameters is different from said second set of fiber property parameters.

4. (Currently Amended) Optical amplifier device according to ~~any of the claims claim 1 to 3~~, ~~characterized in that~~ wherein said first nonlinear optical fiber and said second nonlinear optical fiber are pumped with one common optical pump, whereby said first and second nonlinear optical fibers are pumped with the same pump wavelength (λ_p).

5. (Original) Optical amplifier device according to claim 4, ~~characterized in that~~ wherein said first nonlinear optical fiber has a second order dispersion coefficient β_2 different from the second order dispersion coefficient β_2 of said second nonlinear optical fiber.

6. (Currently Amended) Optical amplifier device according to ~~any of the claims claim 1 to 3~~, ~~characterized in that~~ wherein said first nonlinear optical fiber is

pumped with a first optical pump and said second nonlinear optical fiber is pumped with a second optical pump.

7. (Currently Amended) Optical amplifier device according to claim 6, ~~characterized in that~~ wherein said first optical pump has a pump frequency different from the pump frequency of said second optical pump.

8. (Currently Amended) Optical amplifier device according to claim 7, ~~characterized in that~~ wherein said first and second nonlinear optical fibers substantially have the same second order dispersion coefficients β_2 .

9. (Currently Amended) Optical amplifier device according to ~~any of the claims~~ claim 3 to 8, ~~characterized in that~~ wherein said first nonlinear optical fiber has a zero dispersion wavelength different from the zero dispersion wavelength of said second nonlinear optical fiber.

10. (Currently Amended) Optical amplifier device according to claim 1, ~~characterized in that~~ wherein said first set of fiber property parameters is substantially the same as said second set of fiber property parameters.

11. (Currently Amended) Optical amplifier device according to ~~any of the claims~~ claim 1 to 10, ~~characterized in that~~ wherein said first wavelength interval covers at least a part of a signal band of said parametric amplification of said first nonlinear optical fiber.

12. (Currently Amended) Optical amplifier device according to ~~any of the claims~~ claim 1 to 11, ~~characterized in that~~ wherein said second wavelength interval

covers at least a part of an idler band of said parametric amplification of said second nonlinear optical fiber.

13. (Currently Amended) Optical amplifier device according to ~~any of the claims claim 1 to 12~~, ~~characterized by~~ further comprising at least one further optical fiber connected between said optical demultiplexer ~~(14)~~ and said optical multiplexer ~~(16)~~, whereby each optical fiber receives optical signals within a respective wavelength interval from said optical demultiplexer ~~(14)~~.

14. (Currently Amended) Optical amplifier device according to claim 13, ~~characterized in that wherein~~ at least one of said at least one further optical fiber is provided with a non-parametric amplification.

15. (Currently Amended) Optical amplifier device according to ~~any of the claims claim 1 to 14~~, ~~characterized in that wherein~~ at least one of said nonlinear optical fibers has a fourth order dispersion coefficient β_4 , adapted to give a flat gain band within the associated wavelength interval.

16. (Currently Amended) Optical amplifier device according to ~~any of the claims claim 1 to 15~~, ~~characterized in that wherein~~ said first and second nonlinear optical fibers have non-linearity coefficients γ exceeding $10 \text{ km}^{-1}\text{W}^{-1}$.

17. (Currently Amended) Fiber-optical communication system, comprising an optical amplifier device ~~according to any of the claims 1 to 16~~, said optical amplifier device in turn comprising:

optical input;

_____ a first nonlinear optical fiber, having a first set of fiber property parameters, comprising a first zero-dispersion wavelength;

_____ a second nonlinear optical fiber, having a second set of fiber property parameters, comprising a second zero-dispersion wavelength;

_____ optical demultiplexer connecting said optical input and said first and second nonlinear optical fibers, directing optical signals within a first wavelength interval to said first nonlinear optical fiber and directing optical signals within a second wavelength interval to said second nonlinear optical fiber;

_____ at least one optical pump, pumping said first and second nonlinear optical fibers with radiation having a pump wavelength in the vicinity of respective said zero-dispersion wavelength;

_____ said first nonlinear optical fiber giving a high parametric amplification in said first wavelength interval and said second nonlinear optical fiber giving a high parametric amplification in said second wavelength interval;

_____ optical output; and

_____ optical multiplexer connecting said first and second nonlinear optical fibers and said optical output, merging optical signals from said first and second nonlinear optical fibers into said optical output;

_____ a pump wavelength provided to said first nonlinear optical fiber being positioned outside said first wavelength interval and a pump wavelength provided to said second nonlinear optical fiber being positioned outside said second wavelength interval.

18. (Currently Amended) Fiber-optical communication system according to claim 17, ~~characterized in that~~ wherein said fiber optical system is arranged to use wavelength division multiplexing.

19. (Currently Amended) Fiber-optical communication system according to claim 18, ~~characterized in that~~ wherein said fiber optical system is arranged to use dense wavelength division multiplexing.

20. (Original) Method for optical amplifying, comprising the steps of:
directing optical signals within a first wavelength interval to a first nonlinear optical fiber;
directing optical signals within a second wavelength interval to a second nonlinear optical fiber;
performing first parametric amplification in said first nonlinear optical fiber, by pumping with radiation of a first pump wavelength;
performing second parametric amplification in said second nonlinear optical fiber, by pumping with radiation of a second pump wavelength;
said first pump wavelength being positioned outside said first wavelength interval and said second pump wavelength being positioned outside said second wavelength interval; and
multiplexing amplified signals from said first and second nonlinear optical fibers.

21. (Currently Amended) Method according to claim 20, ~~characterized in that~~ wherein said first wavelength interval being positioned at a high-gain portion of a gain distribution of said first parametric amplification and said second wavelength interval being positioned at a high-gain portion of a gain distribution of said second parametric amplification.

22. (Currently Amended) Method according to claim 20 ~~or 21~~, ~~characterized by~~ further comprising the step of pumping said first nonlinear optical fiber and said

second nonlinear optical fiber with optical signals having substantially the same wavelength.

23. (Currently Amended) Method according to claim 22, ~~characterized by~~ further comprising the step of pumping said first nonlinear optical fiber with a first optical signal and pumping said first nonlinear optical fiber with a second optical signal having a wavelength different from the wavelength of said first optical signal.

24. (Currently Amended) Method according to ~~any of the claims~~ claim 20 to 23, ~~characterized in that~~ wherein said first wavelength interval covers at least a part of a signal band of said parametric amplification of said first nonlinear optical fiber.

25. (Currently Amended) Method according to ~~any of the claims~~ claim 20 to 24, ~~characterized in that~~ wherein said second wavelength interval covers at least a part of an idler band of said parametric amplification of said second nonlinear optical fiber.